

URBAN/MUNICIPAL

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CLASS
ENVIRONMENTAL
ASSESSMENT



URBAN/MUNICIPAL

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CF MAIN STREET/KING STREET
CSO TANK
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CLASS ENVIRONMENTAL ASSESSMENT

MAIN STREET/KING STREET CSO TANK

PUBLIC INFORMATION CENTRE
MAY 25, 1994

THE REGIONAL MUNICIPALITY
OF HAMILTON-WENTWORTH



R.V. Anderson Associates Limited
consulting engineers and architect

REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

MAIN ST./KING ST. CSO TANK

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1.0 INTRODUCTION AND BACKGROUND

1.1 The Environmental Assessment Process

This undertaking is proceeding in accordance with the Class Environmental Assessment for Municipal Water and Wastewater Projects document prepared by the Municipal Engineers Association. The Class Environmental Assessment (Class EA) is a document that describes the planning and design process that proponents must follow in order to meet the requirements of the Environmental Assessment Act (EA ACT). The essential elements of this process are:

- a review and evaluation of all reasonable alternatives;
- public input into the alternatives and the evaluation criteria;
- consideration of environmental impacts during the evaluation.

This project is proceeding under Schedule B of the Class EA process as shown in Figure 1-1.

Public input is important to identify additional issues or concerns to be considered in the selection of the preferred alternative. It is recommended that any concerns regarding the undertaking be resolved through discussions with the Regional Municipality of Hamilton-Wentworth (Region) and their consultant, R.V. Anderson Associates Limited. If there are any concerns which are not resolved through discussions with the Region's representatives, any person or party may request that the project be "bumped up" to a Schedule C project or an individual (full) Environmental Assessment, in accordance with the Environmental Assessment Act. This request would be directed to the Minister of the Environment and Energy. The Minister will consider such requests and give notice of his decision within 66 calendar days of the request. Requests for "bump up" must be submitted in writing to the Minister at the following address:

THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA

The history of the United States is a story of a young nation that grew from a small group of colonies on the eastern coast of North America into a powerful and influential world power. The story begins with the first European settlers in the early 17th century, who came to the New World in search of new opportunities and a better life. Over the years, the colonies developed their own unique culture and identity, and they began to assert their independence from British rule. The American Revolution was a pivotal moment in the nation's history, as the colonies fought for and won their freedom from Britain. The new nation was born, and it went on to shape the course of world history.

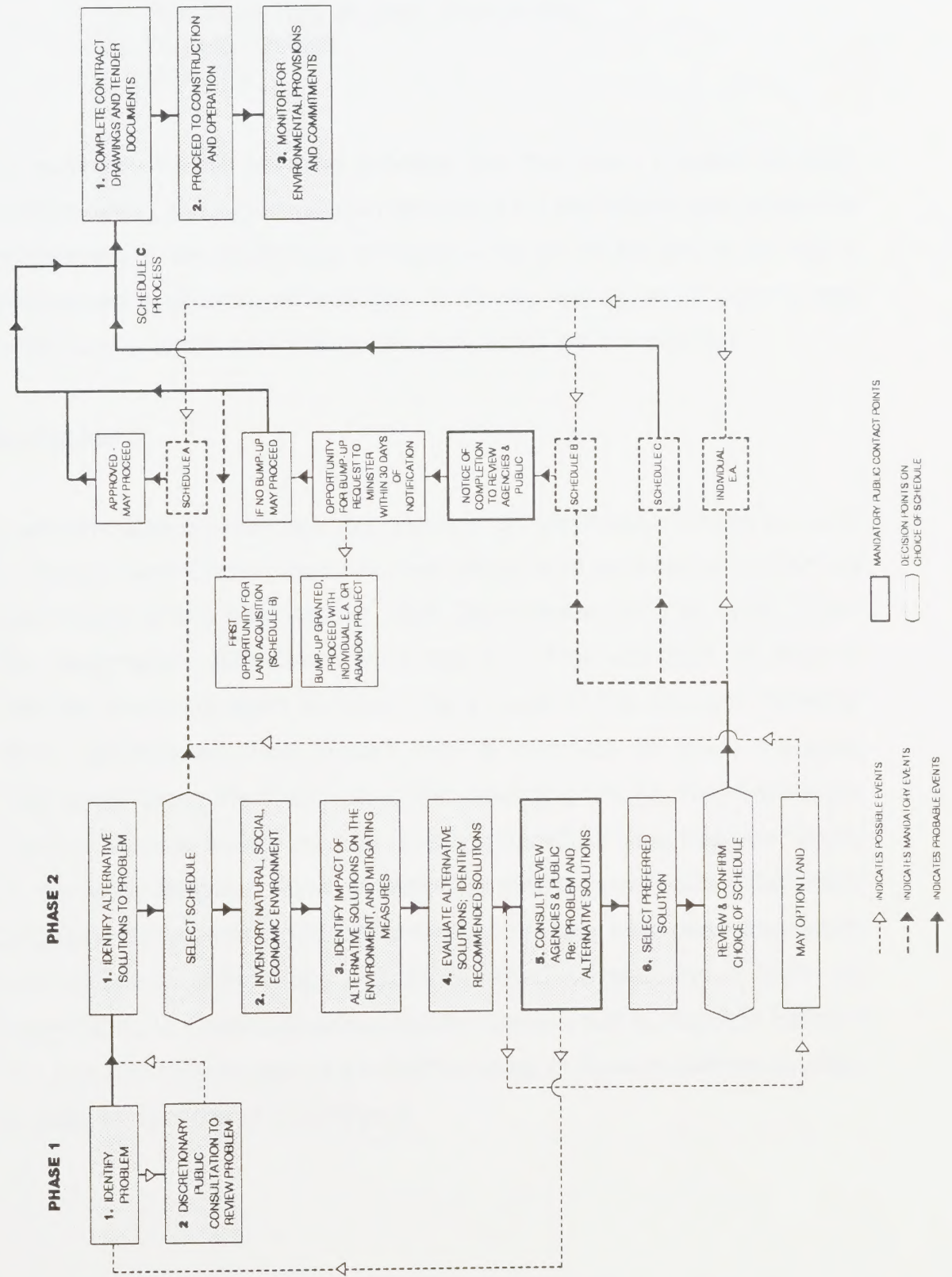
The United States has a rich and diverse history, and it has played a significant role in the development of the world. From the early days of settlement to the present, the United States has been a land of opportunity and innovation, and it has been a source of inspiration and hope for people around the world.

The history of the United States is a story of a nation that has grown from a small group of colonies into a powerful and influential world power. The story is one of a nation that has been shaped by its people, and it is a story that continues to inspire and inform us today.

The United States has a long and proud history, and it has been a source of inspiration and hope for people around the world. The story of the United States is a story of a nation that has grown from a small group of colonies into a powerful and influential world power. The story is one of a nation that has been shaped by its people, and it is a story that continues to inspire and inform us today.

FIGURE 1-1

**PLANNING AND DESIGN PROCESS FOR MUNICIPAL
WATER AND WASTE WATER PROJECTS**



The Honourable Bud Wildman
Ministry of Environment and Energy
15th Floor, 135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5

This report is a summary of the planning process that has been followed to date. Following the public meeting, the recommended alternative will be finalized and notice that the project is proceeding to the next stage of implementation will be issued by way of newspaper advertisement and personal mailings. A 30 day review period commences with this notification during which time final public comments will be received.

1.2 Background

There has been considerable concern over the quality of Ontario's water bodies for many years. Hamilton Harbour and Cootes Paradise were designated as areas of concern by the Water Quality Board of the International Joint Commission (IJC) in 1985. Their reasons for this designation are shown in Table 1-1. The identified sources of contaminants includes municipal point sources. As a result of this concern Remedial Action Plan (RAP) committees were formed with a mandate to study identified environmental "hot spots" along the Great Lakes and develop plans for their restoration. The Hamilton Harbour study to review ways of restoring beneficial uses has been under way since 1986. Currently Stages 1 (Environmental Conditions and Problem Definition) and 2 (Goals, Options and Recommendations) of the RAP process have been completed. One of the recommendations of the Stage 2 report identified the reduction of combined sewage overflows (CSO's) to Cootes Paradise and the western half of Hamilton Harbour as a high priority. It is a long-term goal of the RAP process to develop swimming areas in the north and western sections of the harbour.

TABLE 1-1

IJC Water Quality Board Assessment - NATURE OF PROBLEM (as of June 1985)	
Types of Problems	Sources
Conventional Pollutants Heavy Metals Toxic Organics in Fish Contaminated Sediments Eutrophication Fish Consumption Advisories Aesthetics	Municipal Point Sources Industrial Point Sources Urban Non-Point Combined Sewer Overflows In-Place Pollutants
Municipal and industrial discharges, urban drainage, sediments, and algal decay increase oxygen demand. This oxygen demand depresses hypolimnetic dissolved oxygen levels, especially in the summer. This, in turn, limits the suitability of the deeper part of the Harbour as a fish habitat. Aesthetic quality is diminished by poor water clarity and colour, as a result of high levels of suspended solids, chlorophyll, and dissolved organics, thereby deterring broader recreational use of the Harbour. Significant levels of nutrients, several heavy metals, and PCBs have been detected in the surface sediments from several portions of Hamilton Harbour. Water Quality objectives are exceeded for total dissolved solids, zinc, ammonia, and phosphorus. Iron, cyanide, and phenolics also exceed water quality objectives on occasion, especially adjacent to the steel mills on the south shore. Levels of trace organics (PCB, PAH), and phenols in fish are under investigation.	
Source: The Remedial Action Plan for Hamilton Harbour: Environmental Conditions and Problem Definition, 1992.	

An important goal that has resulted from the RAP process is a plan to restore the fresh-water marsh in Cootes Paradise. "Project Paradise" is one of the largest fresh-water restoration projects in North America. The ultimate goal of this initiative is to restore the marsh ecosystem to support habitat for fish and wildlife.

Concurrent with the RAP process the Region conducted a Pollution Control Planning Study (PCP) in 1991 to develop a strategy to reduce the pollutant loads contributed by the municipal sewer system to the local receiving water bodies. This document essentially identified the problems related to pollutant loading from municipal sources, alternatives to solve this problem and analysis of the alternatives to select a preferred solution. This process is highlighted in this document and referenced with respect to detailed information.

2.0 PROBLEM STATEMENT

The PCP identified three sources of contaminated discharges to the receiving water bodies in Hamilton (i.e. Hamilton Harbour and Cootes Paradise) as follows:

- CSO's through 22 CSO outfalls;
- water pollution control plant (WPCP) bypasses and effluent; and
- separated stormwater discharges.

The Regional Municipality of Hamilton-Wentworth sewer system consists of a combination of separated and combined sewers depending on the location and age of the system. Combined sewers carry both sanitary sewage and stormwater runoff. Typically these sewers overflow during large storm events since they are not designed to carry the full runoff to the WPCP. Reduction of these CSO's will reduce the nutrient loadings to local water bodies that lead to nuisance algae formation and reduced dissolved oxygen levels in the water. In addition, CSO's contribute to high bacterial loadings in the water which preclude contact recreation in the harbour. The combined sewers in Hamilton are known to overflow to local watercourses frequently during the year. These overflows were identified by the IJC and the RAP process as a significant source of nutrients, bacterial, and suspended solids loading to Hamilton Harbour.

3.0 ALTERNATIVE SOLUTIONS

3.1 Identified Alternatives

Alternative approaches for reducing or eliminating the identified contaminant loadings from municipal sources were evaluated as part of the PCP study. The remedial alternatives considered are shown in Table 3-1.

These alternatives vary considerably in both cost and effectiveness. Typically, the source control alternatives are the cheapest approaches but they are unlikely to meet the objectives of the RAP process by themselves. The more expensive engineered solutions either at the WPCP's or in the sewer system are required to produce significant reductions in loadings to achieve the desired improvements in water quality.

3.2 Evaluation Process

The control alternatives described in Section 3.1 above were then evaluated based on the following factors:

- technical feasibility;
- cost-effectiveness;
- ability to meet the desired objectives;
- implementation considerations;
- municipal/public acceptance;
- conflict potential;
- environmental assessment process;
- operation/maintenance considerations.

TABLE 3-1LIST OF PRELIMINARY REMEDIAL ALTERNATIVES

<u>TYPE</u>	<u>REMEDIAL ALTERNATIVE</u>
Source Control	Street Cleaning Public Education Programs Spill Prevention and Management Sewer Use By-Law Enforcement Sanitary System MISA Program Roof Downspout Disconnection Program Infrastructure Rehabilitation Sewer Flushing
Sewer System Control	Adjustment of Overflow Regulators Swirl Concentrators Sewer Separation Inlet Control Method Real Time Control Inline Storage of CSO's Offline Storage of CSO's
Wastewater Treatment Strategies	Improved Treatment at Present Woodward WPCP Expansion of Biological Processes at Woodward WPCP Step Feed at Dundas WPCP Alternative Phys-chem Technologies at Woodward WPCP Small Phys-chem Plants or Coarse Roughing Filters Adjacent to Sewer System Storage Engineered Wetlands

Source: *The Regional Municipality of Hamilton-Wentworth Pollution Control Plan, 1991.*

Qualitative rankings were then assigned to each alternative. The rankings were assigned on the basis of the following characteristics:

1. Good:
 - technically feasible and implementable;
 - high level of improvement and water quality benefit;
 - cost-effective;
 - high public and municipal acceptance;
 - low conflict potential; and
 - low environmental impact.
2. Fair:
 - high level of improvement and water quality benefit;
 - technically feasible with moderate constraints to implement;
 - conflict potential;
 - acceptance difficulties and multi-agent involvement; and
 - straightforward environmental assessment process.
3. Poor:
 - low cost-effectiveness;
 - low potential for implementation;
 - minimal level of improvement and water quality benefit; and
 - full environmental hearing required.

The evaluation is summarized in Table 3-2.

Although ten options were identified as having some potential for reducing discharges to the harbour, the two approaches that were most applicable for reducing CSO loadings were Offline Storage and Inline Storage. Potential methods for providing these facilities were reviewed for cost and ease of implementation.

Table 3-2
COMPARISON AND RECOMMENDATION
OF CONTROL OPTIONS

● Good
⊖ Fair
○ Poor
— Future Study Required

Future Study Required

EVALUATION CRITERIA										
CONTROL OPTIONS	Potential Level of Improvement	Technical Feasibility	Cost Effectiveness	Implementation Considerations	Municipal + Public Acceptance	Conflict Potential	Environmental Assessment Process	Operation and Maintenance Considerations	Overall Rating	Recommended for Further Evaluation
SOURCE QUALITY CONTROL										
Street Sweeping	○	●	○	●	⊖	●	●	○	○	NO
Public Education Programs	○	●	●	●	⊖	●	●	●	⊖	YES
Roof Downspout Disconnection	⊖	⊖	⊖	⊖	⊖	●	●	●	⊖	YES
Infrastructure Rehabilitation	○	●	○	⊖	⊖	●	●	○	○	NO
SEWER SYSTEM CONTROL										
Adjustment of Regulators	⊖	●	●	●	●	●	●	●	●	YES
Swirl Concentrator	○	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	YES
Real Time Control	⊖	●	⊖	●	⊖	●	●	●	●	YES
Offline Storage	●	●	●	●	●	⊖	●	●	●	YES
Inline Storage	●	●	●	●	⊖	●	⊖	⊖	●	YES
TREATMENT OPTIONS										
Improved Treatment at Woodward WPCP	●	-	●	●	●	●	●	●	●	YES
Plant Expansion at Woodward WPCP	●	●	●	●	●	⊖	⊖	-	●	YES
Stormwater Management (Wet) Ponds	●	●	●	⊖	⊖	⊖	●	⊖	●	YES

Source: The Regional Municipality of Hamilton-Wentworth Pollution Control Plan, 1991.

The result of the analysis was a recommendation that a combination of inline and offline storage facilities as the best method to control CSO's. The plan of proposed CSO tanks is shown on Figure 3-1 or as an alternative on Figure 3-2.

The Region has already implemented two of the storage facilities identified in the plan (i.e. the Strachan Ave. CSO tank and the Greenhill CSO tank) and is now proposing to implement a third CSO tank in the King St./Main St. area.

3.3 King St./Main St. CSO Tank Project

Two drainage areas discharge CSO's to Chedoke Creek and ultimately Cootes Paradise. They are identified on Figure 3-1 as the King and Dundurn drainage areas. These CSO's discharge to Chedoke Creek 28 times in an average year. They are a significant contributor of nutrient and bacterial pollution to Cootes Paradise and Hamilton Harbour.

The King St./Main St. CSO tank has been identified in the pollution control plan as the best method to reduce the CSO's from the King and Dundurn drainage areas. This reduction will support the water quality goals of Cootes Paradise and the Hamilton Harbour by reducing sewage loadings to these water bodies.

3.4 Site Selection Rationale (Main St./King St. CSO Tank Project)

3.4.1 Selection Criteria

The selection of a site to accommodate the construction of the proposed underground storage tank to contain the King and Dundurn drainage area sewer overflows is influenced by a number of factors. Key items critical to the selection include the following:

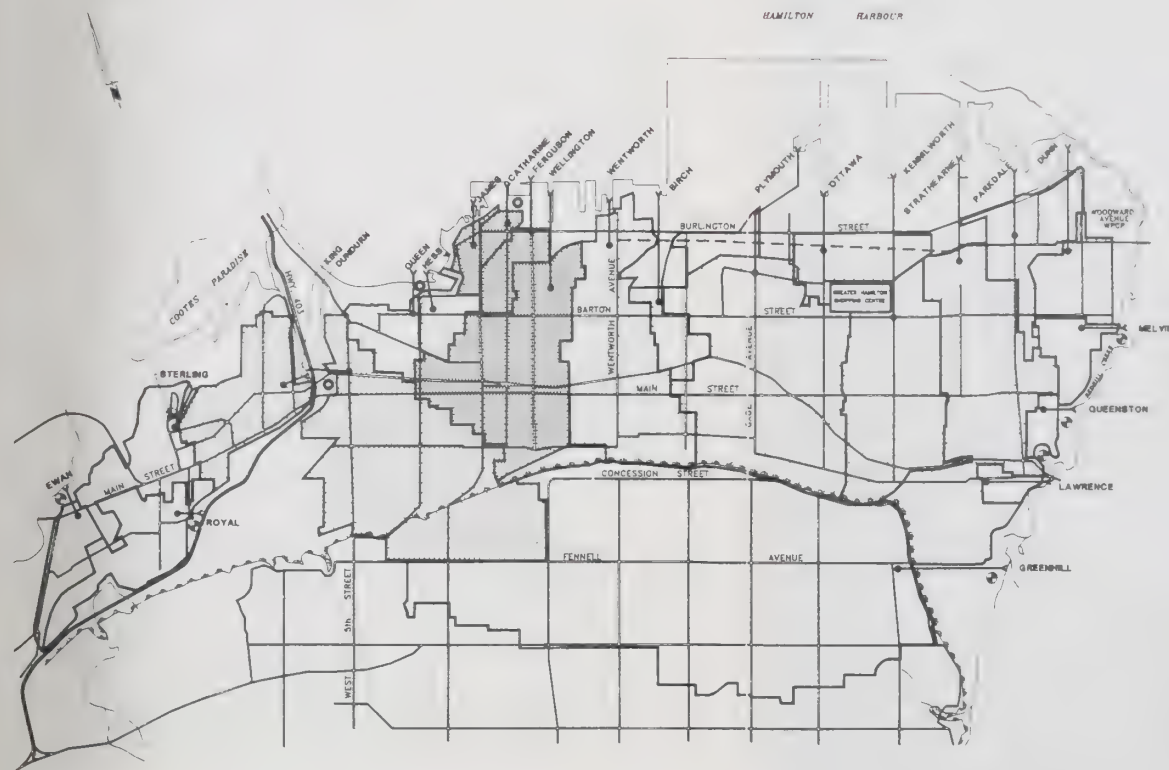


REGIONAL MUNICIPALITY OF
HAMILTON - WENTWORTH
POLLUTION CONTROL
PLAN

LEGEND

-  Combined Sewershed
-  Combined Sewersheds Draining To A Common CSO Storage Facility
-  CSO Outfall
-  Offline Storage Facility
-  Lumped Offline Storage Facility
-  Proposed CSO Tunnel Interceptor

**CSO STORAGE OPTION #3
OFFLINE STORAGE FACILITIES
AND INLINE STORAGE FROM
THE WOODWARD AVENUE WPCP
TO GAGE AVENUE**



REGIONAL MUNICIPALITY OF
HAMILTON - WENTWORTH
**POLLUTION CONTROL
PLAN**

LEGEND

-  Combined Sewershed
-  Combined Sewersheds Draining To A Common CSO Storage Facility
-  CSO Outfall
-  Offline Storage Facility
-  Lumped Offline Storage Facility
-  Proposed CSO Tunnel Interceptor

**CSO STORAGE OPTION #4
OFFLINE STORAGE FACILITIES
AND INLINE STORAGE FROM
THE WOODWARD AVENUE WPCP
TO WENTWORTH AVENUE**

(i) Relationship to Location of Overflow Pipes

The two methods for intercepting combined sewage overflows (CSO's) includes gravity flow to a storage tank and gravity flow to a pumping station and then pumping to a storage tank. The concept of pumping flows from the overflow pipes to the tank and thus removing the "gravity" constraint is not a practical option due to the high cost of pumping the large peak flows generated during storm events. The gravity flow to the storage tank is, therefore, the only practical option.

Since the tank must be located such that the existing overflow pipes can be intercepted by gravity, this is one of the most constraining factors in selecting a site. The availability of sufficient open space near the overflow pipe for a tank is limited. In the case of the proposed CSO tank, this constraint is even more restrictive due to the fact that two separate drainage areas and therefore two overflow pipes need to be considered.

(ii) Availability of Open Space

The availability of a site of sufficient size to accommodate the tank is a key factor to consider. Obviously, the purchase and/or expropriation of land that may be functional for the tank but that currently has other uses (e.g. houses, businesses, etc.) is a possibility. This, however, is best avoided if possible because of the permanent disruption it has for existing owners and the high cost of the option. The proposed CSO tank requires an area of approximately 10 000 m² (1 ha) to accommodate the required volume.

An “open space” location is best suited for the project since the tank will be buried and the existing uses of the open space area may return to the site once construction is completed.

(iii) Other Factors

Other factors that must be considered in the evaluation include:

- environmental impacts (natural, social, cultural)
- cost (construction and operations and maintenance)
- suitability/feasibility for construction
- disruptions during construction (traffic, loss of land use, etc.).

3.4.2 Alternative Evaluation

As noted earlier, there are two overflow pipes being considered from separate drainage areas. The “King” drainage are on the west side of Hwy. 403 and the “Dundurn” drainage area on the east side of Hwy. 403 are both serviced by combined sewers. During wet weather conditions these systems overflow into Chedoke Creek at the intersection of Hwy. 403 and King St. The site for a tank required to control these overflows therefore, must be located as close as possible to this location in order to be able to connect all the pipes that will contribute flows into the tank.

An investigation in the area was initiated by looking for “open space” locations that could accommodate the proposed tank. Three sites were identified as follows:

1. Strathcona Park
2. Kay Drage Park
3. Cathedral Park.

Considering the essential criteria that must be met in order for the site to be functional for the proposed tank, the following is noted:

1. Strathcona Park - sufficient in size of open space
 - considerable loss of use for local residents during construction
 - overflow pipes cannot be connected by gravity, particularly the King St. overflow (too far away).

2. Kay Drage Park - sufficient in size of open space
 - considerable loss of use of existing soccer fields during construction
 - the park is located on the site of a former municipal landfill so construction would require excavation and disposal of refuse and considerable mitigation of potential methane migration
 - the landfill material is not a suitable foundation for the tank so foundation construction would be difficult
 - construction traffic would have to be routed down residential streets

- overflow pipe connections will be costly due to size and long distances.
3. Cathedral Park
- sufficient in size of open space
 - the park is considered to be a "low use" facility so loss of use by local residents would be minimized
 - some waste material is present on-site so it would have to be removed and disposed of
 - construction traffic will be restricted to regional roads
 - there will be some traffic disruption on King Street due to construction traffic
 - overflow pipes can be connected by gravity (some sewers surcharged in full tank condition)
 - this is the lowest cost alternative.

This review has identified the fact that the preferred "open space" site with sufficient size to accommodate the tank and that could accommodate gravity connections from the overflow sewers is Cathedral Park. Further investigations are on-going to determine the suitability of Cathedral Park including detailed soils investigations, traffic control, etc.

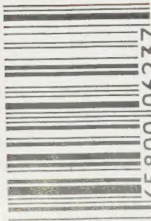
3.5 Mitigative Measures (Main St./King St. CSO Tank Project)

The following measures will be included in the design to reduce the impact of the facility construction/operation:

- i) Landscaping features: the site will be landscaped with appropriate grading and vegetation to suit the final use in consultation with the City of Hamilton Parks Department.
- ii) Traffic control: a traffic control plan will be developed in consultation with the Regional Roads Department and the Ministry of Transportation to minimize the impact of construction on local traffic patterns.
- iii) Odours: the design will utilize the same flushing system as the Strachan Avenue CSO tank which has proven to be very successful in controlling odours.

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